

Cruise Report

Compiled by:

F.S.Poseidon

Cruise No.: 334

Dates of Cruise: from 15.03.2006 to 03.04.2006

Areas of Research: Marine Biology, Genetics, Oceanography and Geology

Port Calls: Algeciras

Institute: Institut für Geowissenschaften, Sigwartstrasse 10, D-72076 Tübingen

Chief Scientist: Dr. Hartmut Schulz

Number of Scientists: 9

Project: Biodiversität von Foraminiferen im Nord-Atlantik und im westlichen Mittelmeer

Cruise Report

This cruise report consists of 19 pages including cover:

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1. Scientific crew

Name	Function	Institute	Leg
Dr. Schulz, Hartmut	Chief scientist	IFG-TÜ	334
Bayer, Margret	Technicien	IFG-TÜ	334
Denker, Claudia	Student	IFM-GEOMAR	334
Prof. Hemleben, Christoph	Scientist	IFG-TÜ	334
Martínez Botí, Miguel	Student	ICTA-UAB	334
Numberger, Lea Dagmar	Scientist	IFG-TÜ	334
Palamenghi, Luisa	Student	INETI-P	334
Storz, David	Student	IFG-TÜ	334
van Raden, Ulrike	Student	IFG-TÜ	334
Total 9			

IFG-TÜ Institut für Geowissenschaften, Universität Tübingen
 IFM-GEOMAR Institut für Meereskunde-GEOMAR, Universität Kiel
 ICTA-UAB Institute of Environmental Sciences and Technology, Autonomous
 University of Barcelona, Catalonia (Spain)
 INETI-P Departamento de Geologia Marinha, INETI, Alfragide, Portugal

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2. Research programme

The main objectives of POSEIDON cruise 334 were to conduct physical and biological oceanographic measurements in combination with plankton net and sediment sampling across the hydrographic Açores Front in the Eastern North Atlantic and along a West-East transect in the Western Mediterranean by

- in situ measurement of sea water conductivity, temperature, density and sampling of the water column (0-max 2000m) by a CTD/Rosette water bottle,
- en route ADCP and echo sounder profiling,
- plankton sampling of the water column and surface waters by a fluorometer, plankton net hauls and by water pumping through a filtering device,
- shallow sediment coring of max 60cm-long cores retrieved by a multicorer (in the Mediterranean only).

3. Narrative of the cruise with technical details

Wednesday 15.03.2006

Ship left Las Palmas as planned in the morning at 9:00 UTC while fine sunny weather and calm winds from N-NE, heading to the first station (32N, 20W) in order to start the S-N transect at 20W across the Azores Front. Night with fresh and steady winds of about 5 Bft. Setting up instruments and lashing. 16:30h security advice by the 2nd officer.

Thursday 16.03.2006

Day continues with arranging instrumentation, including filtering device. Plankton pumping installed, running at 15:30pm with a capacity of 30l/minute. First pump sample with only a few PF and a lot of thin-shelled pteropods, mostly *Creseis* and *Limacina*. No diatoms present that could indicate productive spring phytoplankton bloom or frontal system proximity. Planning of station (32N, 20W) for the estimated time on station to be at 23:30h, and for the second station (33N, 20W) to be the next day at about 10:00h. 19:30h meeting to inform to the crew of POSEIDON about the scientific goals of POS 334. Heading station 1 by increasing wind speed and gale warning in the areas of the Azores, Madeira and also for the area in between, as seen from maps of weather forecast, for the next 30 and also 48 hours. Rough sea in the evening with wind speeds of about 20 to 28 knots and big swell with increasing tendency. Decision to postpone station 1 and to go about 0.7 degrees latitude to the North until the next morning. Hope for good weather and day conditions to deploy the first station in the area as planned.

Friday 17.03.2006

Increasing wind and swell during the day with strong gales make it impossible to deploy any instrument. Hence filtering and on-track pumping is the only investigation. Maximum of wind speeds between 32 and 49 knots measured in the late evening between 20h and 23h. Calming of winds and waves started at about midnight. Decision to stay in the area and not to proceed further to the North, i.e. to stay in the proximity of planned station 1 at 32N. In ship-thermosalinograph recording seems to be reasonable for temperature (17,9°C), in line with the independent sensor of the DWD station, but salinity unreasonably low, at about 32,5-32,9 per mil, far too low for open Atlantic surface waters.

Saturday 18.03.2006

After weather distinctly calmed to 5-6 Bft approach to planned station 2 at 33N, 20W which was reached after lunchtime at 12h. Deployment of CTD/Biooptics 0-100m with standard depth intervals of 10, 30, 50, 70, 90m, CTD 0-700 with sampled intervals of 100, 120, 150, 250, 400 and 600m, respectively, following the ships number #67. Water samples from the CTDs were taken and filtered from all levels and at distinct depths for isotope analyses. CTD recording worked satisfactorily with no recording of the 0-100m below about 20-30m by unknown reasons. After two CTD casts, 3 Multinets (MSN) were deployed, two times to a depth of 100m with standard sampled intervals of 0-20, 20-40, 40-60, 60-80, and 80-100m. Yield of PF was moderate under a surface water temperature of 17,7-17,9°C and a well-mixed winter layer down to 200m depth, mostly with juveniles and premature specimens of *G. ruber* and *G. sacculifer*. Station work was completed at 17:15h, heading North towards next station 3 at 35N/20W. Ship speed of about 8 to 8.5 knots, despite rough sea and winds of 6-7 Bfts from W-NW (280-310°).

Sunday 19.03.2006

In the morning, station #68 at 35N/20W was reached at 8:30h. Standard program of a total of 5 deployments (3 MSN and 2 CTD) performed in a total of about 2,5 hours. All instruments worked well, unless the Bio-Optics Fluorometer like on station 2. No recording when attached and set to water with the CTD, possibly because of problems with the sealing of the plug-interface to retrieve the data after deployment. Since water temperatures had suddenly dropped from 17,8 to 16,8°C during the night at about 3 a.m. (at a latitude of 34,4°N) we expect a somewhat more productive situation with more PF, which was substantiated by all levels in the MSN. Picking and isolation PF specimens of the species *G. ruber* and *G. sacculifer*, but also of *Gt. truncatulinoides* (left coiling), *Gt. hirsuta* (right coiling) and some specimens of *Gt. cristata* and *Gt. humilis*. A yield of a total of 100 specimens at Sunday evening including the previous stations and ongoing plankton pumping. Water samples from the CTDs were taken and filtered from all levels and at distinct depths for isotope analysis. In the afternoon a separate source of pressurized flow from the sea-water “Aquarium-Pumpe” was installed with the help of the engineers on demand of Miguel Boti, in order to filter online larger volumes of water for stable isotope, biomarker and coccolith taxonomic analyses. Second drop in surface temperature from 16,5 to 15,8°C in the afternoon at 16:00.

Monday 20.03.2006

Two stations: Station #69, 8:00 UTC, ~36°N20' and Station #70, 18:30 UTC, ~37°N15' along the 20°W-transect successfully completed with full programs, whilst calm to moderate sea and warm, sunny weather during most of the day. Concentration of PF was still moderate, despite the previous second drop in surface temperature, continuously decreasing during the day to 15,3°C. No “real” cool assemblage, but a relatively large number of adult *Gt. truncatulinoides* (left coiling) and *Gt. hirsuta* (right coiling). Picking and filtering until the late night. Plankton net and large volumes of waters on both stations obtained for Miguel Boti

Tuesday 21.03.2006

Morning station (Station #71, ~38°N25' ~20°W) on the S-N profile was successful. Plankton samples with a “new” cold element: *Neogloboquadrina incompta* with mostly very small and early ontogenetic stages. After station 6 heading towards to the NE, to the northernmost point of the Atlantic section of the cruise, to be reached at 15:00 UTC. Unfortunately a second low with storm of 10-12 Bft from the NW-Atlantic is rapidly progressing towards East and might affect the track. After serious warning via email about 15 minutes before reaching the next station, decision was made to cancel and to try to escape to the SE. In the evening at 21:00 calm weather with 4 Bft and a speed of the ship of 9.5-10 knots showed that we could leave behind the storm. We hope, by going to the SE towards Gibraltar, to stay in the strong southern high pressure zone, that hopefully will also resist the low pressure zone with strong winds and rain of North West Atlantic. Next station, after a long transit, planned right off the Strait of Gibraltar for Friday, 24.03.2006, off southern Portugal at 36N,00', 08W30'. In total, so far 226 PF were isolated for genetic analysis, about hundred water samples from the surface pumping and CTD sampling were filtered. The echo

sounding system, despite water depths of >4500 or even >5000m, is continuously recording the bathymetry along the cruise track, in poor quality, however.

Wednesday 22.03.2006

Whole day and night steaming with strong wind from the back and later from starboard side towards Gibraltar. Birthday party in the evening.

Thursday 23.04.2006

Strong winds with Bft of 7-8 give the impression that the deep pressure over the North West Atlantic might also affect the next stations on our way East and possibly also in the Western Mediterranean. However, the constant speed of more than 9 knots over the last 200Nm allows us more than 6 hours to look for another station before the planned station at 36N, 00°, 08W30' off the Strait off Gibraltar. Unfortunately, again, the rough winds and high waves make it impossible to take that station scheduled for the evening at about 19:00h.

Friday 24.03.2006

Work starts with Station #72 planned for the morning at 8:30 ship time (7:30 UTC). This is the last chance to sample the Atlantic before entering the Mediterranean and entering Algeciras Harbour Bay, right off Gibraltar. Weather significantly calmed down over night. A sunny morning to begin our day program with a shallow CTD to a hundred meters depth, followed by a deep CTD cast down to 2000m in order to obtain both, the surface waters and the deeper waters of the Easternmost area of the Atlantic of our Atlantic-Mediterranean section. The latter CTD cast nicely showed the intermediate salinity maximum linked to the Mediterranean outflow, also characterized by a strong increase in oxygen content, even higher than in the surface waters. A deep plankton net followed that shows a quite diverse PF fauna with a significant number of empty shells in the deep (below 500m), for instance in the deepest casts, but also a steady, but low concentration in mostly small living specimens, and with even less adult specimens, some of them with a thick calcite crust to testify that these may have been on their way to the uppermost water column for reproduction. During this station, 2 MSN of 0-300m, one MSN 0-700m and finally a second deep MSN down to 2000m was run in order to satisfy all needs, partly compensating for the cancelled stations before.

Saturday 25.03.2006

Entering the Strait of Gibraltar in the morning with fine weather and calm winds in the back, whereas dolphins play with the bow waves. Entering the Bay of Algeciras in order to load oil in Algeciras harbour. Short stop there of only 2 hours, but time enough to put feet for a short walk on land.

Sunday 26.03.2006 to Thursday, 30.03. 2006

A total of 7 Stations, #73-#79 were run under perfect weather conditions in the western Mediterranean. Station work began each morning and a second station of the day was performed also in the evening hours of the 26th and 28th. Stations #75 and #76 as well as #77 to #79 were taken at water depths of > 2500m on the Balearic Abyssal Plain, where 2000m deep hauls of the CTD and Multinet could be performed. All instruments by routine work fine, and 2-3 casts of the CTD as well as casts 2-4 of the Multinet were deployed at each of these stations. However, multicorer at station #76 did not release, since it had not reached the bottom (see 5).

Friday 31.03.2006

The last station #80 on the Balearic Abyssal Plain targeted southwest off Sardinia. From the echo sounding, this station is about 100m shallower than the two previous ones at about 2760m, indicating the rise of Sardinia island. PF yield poor to moderate, as it also was the case for the other stations from the deep western Mediterranean Basin.

Saturday 01.04.2006

Station work #81 as regular started at 8:00 again in the sunny and calm (wind up to 4 BFT) morning after we left behind the Balearic Basin in order to complete our Mediterranean W-E transect with two relatively shallow stations in the order of 1000m water depth NW and N of

Sicily, respectively. Water column sampling includes several multiunit hauls and CTD profiling to a maximum depth of 700m. Survey of about 45 minutes to about one mile beyond the previewed station point of 38N45'/008E00. Multicorer #81 from a relatively flat topography at about 1140m depth. Following sounding depth of 1134m, we deployed the multicorer down to a sounding depth of 1100m but finally touched down at 1226m cable length, i.e. with a difference of about 90m to the depth indicated by the bathymetry. We retrieved again 8 high-quality cores of calcareous foraminiferal mud of about 40cm recovery with a intact fluffy layer consisted of highly degraded organic particles of pale brown colour and of few pteropods and foraminifera. The washed sand residue did not contain any living benthic foraminifera at all. Birthday barbecue on deck in the evening.

Sunday 02 April 2006

Weather in the morning started sunny and warm, and cooling down by increasing winds during the day to 5Bft. Finished work at last station #82 of the cruise 38N40/012E30 as usual with a shallow and deep MSN (0-100, 0-700) and CTD (0-100, 0-700), respectively at 9:30h UTC. After these routines we had decided not to sample with the multicorer, because the area turned out to be extremely rough from the station echo sounding, with frequent hills and troughs, i.e. a generally steep topography. Packing and deinstalling instruments during our last day at sea, heading to Messina for about 165 nm to go. Messina port was reached as planned in the morning of the 03 April 2006.

4. Scientific report and first results

The North Atlantic hydrography of the Subtropical Gyre, of the Açores Front/Current System and of the Atlantic Transitional Water was recorded by CTD casts, bio-optics and plankton net hauls between ocean surface and 700 m. Investigations continued along a W-E transect in the western Mediterranean where samples were also collected from a multicore to have a comparison in between the water/planktic characteristics and the superficial sediment layer.

During the cruise, the general patterns of still a winter thermal and biological situation were found in the north Atlantic, as well as in the Mediterranean. This situation particularly was characterized by extremely low phytoplankton, as well as by extremely low zooplankton concentrations. Planktonic foraminiferal yields in the MSN were mostly of only juvenile specimens. Deep tows in the Mediterranean showed a relatively large number of empty PF shells. The fluffy layer from the Multicores, too, did not reveal any sign of deposition of fresh detritus.

However, a large number of PF specimens could be isolated and preserved for genetic analysis, which was the main objective of the cruise POS334. Detailed analysis of the hydrographic data, as well as of the filter and MSN samples in the Atlantic will help to constrain the intensity and position of the Açores Front, not obvious from the en route surface temperatures along the ship track. For the western Mediterranean, measurements and samples will help to decipher the impact of the "imported" Atlantic floral and faunal plankton elements on the Mediterranean community.

5. Scientific equipment: moorings and instruments

5.1. CTD/Water Sampling

CTD measurements were performed with the ship's CTD system down to 2000 m, but mostly from 0-100m and 0-700m depth. Parallel water sampling was done by a total of 12 10-L Niskin bottles from variable depths.

5.2. Multinet Sampling

A Hydrobios multiple opening-closing net collected samples of planktic organisms by vertical hauls (100-µm mesh size, 50x50 cm² opening).

5.3. Bio-Optics

At the CTD-Stations, the vertical phytoplankton distribution was estimated by means of a Fluoroprobe (bbe MOLDAENKE, Kronshagen, Kiel) in order to quantify the amount of Chlorophyceae, Cyanobacteria, Cryptophyceae, Bacillariophyceae and Dinophyceae on the basis of their fluorescence characteristics.

5.4. PC-Log

A PC-Based programme package consecutively logged the data streams from the ship's navigational units, as well as from the thermosalinograph and from the DWD (Deutscher Wetterdienst) sensors.

5.5. Deep Sea Echo Sounder

A 12 kHz ELAC-Echosounder provided depth information and also some hints on the general nature of the sediments on the sea floor. It is important to notice that these uncorrected depths did not fit to the depths indicated by the cable lengths when using the Multicore down to the sea floor. In contrast, we corrected for a linear offset, that might have been derived from the higher salt content of the Mediterranean waters (see graph).

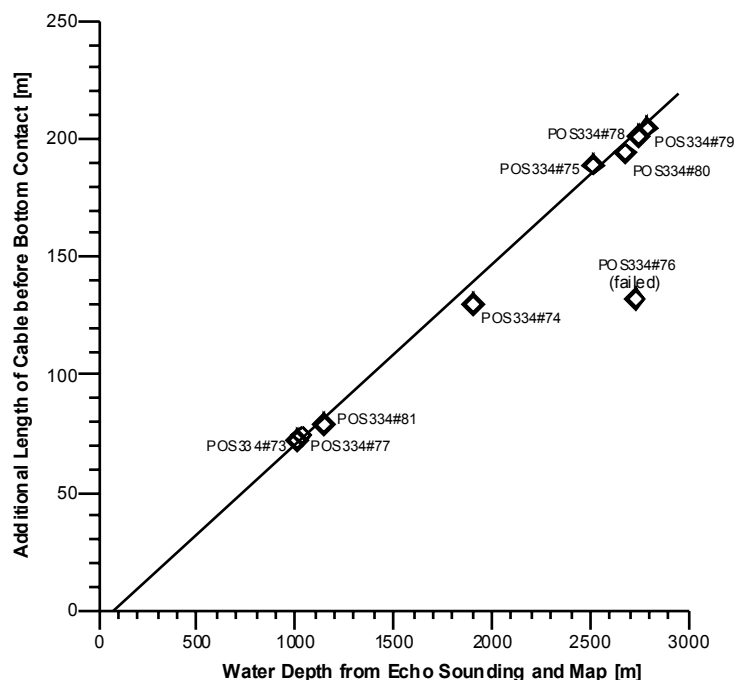


Fig. 1. Plot of the systematic offset between cable length and water depth following echo sounding at the 9 multicorer stations in the western Mediterranean.

5.6. En-Route Water Sampling (Pumping)

A simple array of sieve with a mesh size of 30µm was installed on the back deck in order to continuously sample surface waters pumped by the “Aquarienpumpe” at a supply of about 30l/min.

5.7. Multicorer

A Multicorer equipped with 8 tubes of 10cm diameter/60 cm length was used in the Mediterranean part of the cruise to recover sediments i.e. short sediment cores including an intact sediment-water interface. The Multicore was used at 9 stations with 8 successful hauls, when all tubes were equally filled with undisturbed sediment profiles of a length of 25-45cm.

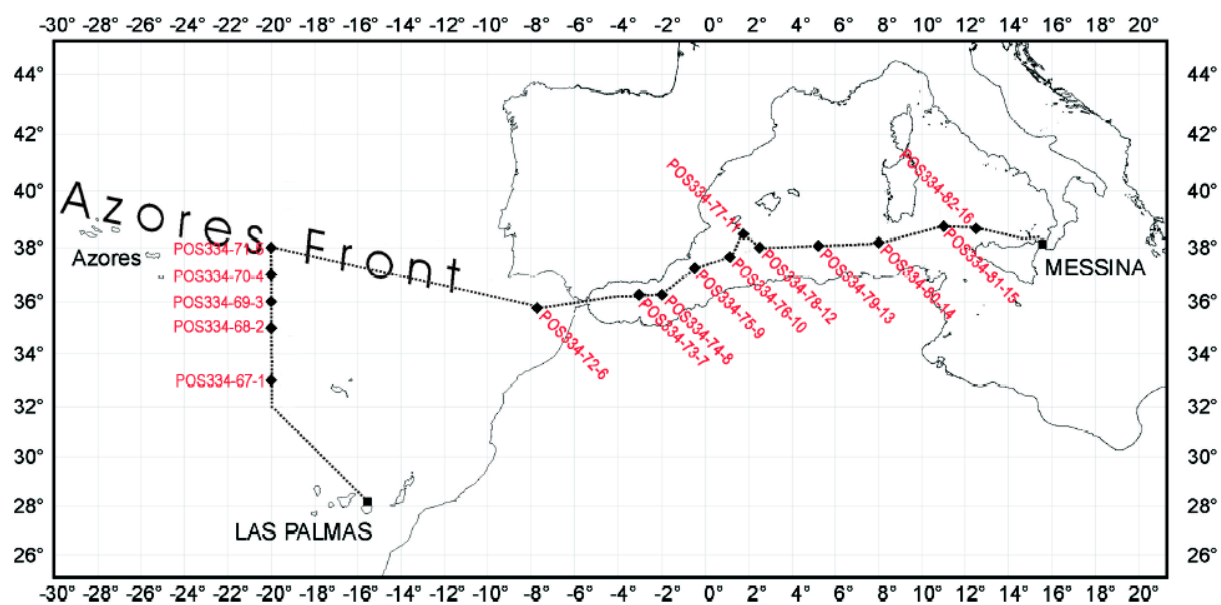
6. Acknowledgements

We would like to thank Captain Michael Schneider and his crew for their cooperation and help during this cruise.

7. Appendices

A. Map

B. Station list



A. Map with stations investigated during Cruise POS334 (Las Palmas-Messina, 15.03. - 03.04.2006).

B. Station List of Cruise POS334 (Las Palmas-Messina, 15.03. - 03.04.2006).

Stat.-No.		Date	Time UTC	Description	LATITUDE	LONGITUDE
		15.03.2006	16:25	Beginn der Forschungs- und Stationsarbeiten		
66	1	15.03.2006	16:25	Wasserproben	28° 55,00' N	016° 14,50' W
67	1	18.03.2006	13:05	Ship @ Station	32° 59,82' N	019° 59,84' W
			13:10	CTD/Rosette to water	32° 59,82' N	019° 59,83' W
			13:15	Heaving up	32° 59,86' N	019° 59,86' W
			13:25	CTD/Rosette on deck	32° 59,86' N	019° 59,86' W
67-2	1	18.03.2006	14:20	CTD to water	32° 59,98' N	019° 59,96' W
			14:40	Heaving up	32° 59,97' N	019° 59,93' W
			15:10	CTD on Deck	32° 59,99' N	019° 59,97' W
67-3	1	18.03.2006	15:35	MSN to water	32° 59,97' N	019° 59,99' W
			15:42	Heaving up	32° 59,97' N	019° 59,99' W
			15:50	MSN on Deck	32° 59,97' N	019° 59,95' W
67-4	1	18.03.2006	16:05	MSN to water	32° 59,97' N	019° 59,97' W
			16:12	Heaving up	32° 59,96' N	019° 59,97' W
			16:15	MSN on Deck	32° 59,96' N	019° 59,97' W
67-5	1	18.03.2006	16:22	MSN to water	32° 59,93' N	019° 59,92' W
			16:48	Heaving up	32° 59,97' N	019° 59,92' W
			17:15	MSN on Deck	33° 00,02' N	019° 59,96' W
			17:15	End of Station	33° 00,02' N	019° 59,96' W
68	1	19.03.2006	08:44	Ship @ Station	34° 59,98' N	019° 59,96' W
			08:46	MSN to water	34° 59,97' N	019° 59,96' W
			08:51	Heaving up	34° 59,97' N	019° 59,96' W
			08:56	MSN on deck	34° 59,97' N	019° 59,94' W
68-2	1	19.03.2006	09:01	MSN to water	34° 59,97' N	019° 59,99' W
			09:04	Heaving up	34° 59,97' N	020° 00,00' W
			09:09	MSN on deck	34° 59,98' N	020° 00,00' W
68-3	1	19.03.2006	09:13	MSN to water	34° 59,98' N	020° 00,02' W
			09:30	Heaving up	34° 59,98' N	019° 59,96' W
			09:50	MSN on deck	34° 59,98' N	020° 00,01' W
68-4	1	19.03.2006	10:01	CTD to water	34° 59,96' N	019° 59,99' W

			10:07	Heaving up	34° 59,96' N	019° 59,99' W
			10:13	CTD on Deck	34° 59,97' N	019° 59,99' W
68-5	1	19.03.2006	10:37	CTD to water	34° 59,98' N	019° 59,99' W
			10:54	Heaving up	34° 59,96' N	020° 00,04' W
			11:19	CTD on Deck	34° 59,98' N	019° 59,95' W
			11:20	Station completed	34° 59,98' N	019° 59,95' W
69	1	20.03.2006	07:52	Ship @ Station	36° 19,95' N	019° 59,88' W
			08:06	CTD/Rosette to water	36° 19,97' N	020° 00,04' W
			08:11	Heaving up	36° 19,96' N	020° 00,05' W
			08:17	CTD/Rosette on deck	36° 19,96' N	020° 00,06' W
69-2	1	20.03.2006	08:39	CTD to water	36° 19,98' N	020° 00,05' W
			08:43	Heaving up	36° 19,99' N	020° 00,06' W
			08:50	CTD on Deck	36° 19,97' N	020° 00,02' W
69-3	1	20.03.2006	09:03	MSN to water	36° 19,84' N	019° 59,90' W
			09:20	Heaving up	36° 19,82' N	019° 59,85' W
			09:39	MSN on Deck	36° 19,81' N	019° 59,82' W
69-4	1	20.03.2006	09:44	MSN to water	36° 19,83' N	019° 59,82' W
			09:48	Heaving up	36° 19,82' N	019° 59,80' W
			09:54	MSN on Deck	36° 19,82' N	019° 59,77' W
69-5	1	20.03.2006	09:56	MSN to water	36° 19,85' N	019° 59,76' W
			10:00	Heaving up	36° 19,85' N	019° 59,75' W
			10:06	MSN on Deck	36° 19,81' N	019° 59,71' W
69-6	1	20.03.2006	10:16	CTD/Rosette to water	36° 19,86' N	019° 59,69' W
			10:20	Heaving up	36° 19,85' N	019° 59,65' W
			10:25	CTD/Rosette on deck	36° 19,87' N	019° 59,64' W
69-7	1	20.03.2006	10:31	CTD to water	36° 19,88' N	019° 59,62' W
			10:49	Heaving up	36° 19,88' N	019° 59,62' W
			11:11	CTD on Deck	36° 19,94' N	019° 59,40' W
			11:20	Station completed	36° 19,94' N	019° 59,39' W
70	1	20.03.2006	18:15	Ship @ Station	37° 05,32' N	020° 00,47' W
			18:17	CTD/Rosette to water	37° 05,32' N	020° 00,47' W
			18:22	Heaving up	37° 05,34' N	020° 00,44' W
			18:28	CTD/Rosette on deck	37° 05,35' N	020° 00,37' W
70-1	1	20.03.2006	18:36	MSN to water	37° 05,40' N	020° 00,33' W

			18:57	Heaving up	37° 05,53' N	020° 00,12' W
			19:20	MSN on Deck	37° 05,63' N	019° 59,85' W
70-2	1	20.03.2006	19:24	MSN to water	37° 05,67' N	019° 59,79' W
			19:30	Heaving up	37° 05,70' N	019° 59,73' W
			19:34	MSN on Deck	37° 05,71' N	019° 59,68' W
70-3	1	20.03.2006	19:39	MSN to water	37° 05,74' N	019° 59,60' W
			19:44	Heaving up	37° 05,77' N	019° 59,54' W
			19:48	MSN on Deck	37° 05,77' N	019° 59,47' W
70-4	1	20.03.2006	20:00	CTD/Rosette to water	37° 05,79' N	019° 59,27' W
			20:05	Heaving up	37° 05,82' N	019° 59,22' W
			20:11	CTD/Rosette on deck	37° 05,88' N	019° 59,17' W
70-5	1	20.03.2006	20:30	CTD to water	37° 05,95' N	019° 58,98' W
			20:47	Heaving up	37° 06,02' N	019° 58,86' W
			21:12	CTD on Deck	37° 06,13' N	019° 58,73' W
			21:30	Station completed	37° 06,35' N	019° 59,11' W
71	1	21.03.2006	08:21	Ship @ Station	38° 22,91' N	020° 00,34' W
			08:24	CTD/Rosette to water	38° 22,91' N	020° 00,33' W
			08:28	Heaving up	38° 22,94' N	020° 00,34' W
			08:35	CTD/Rosette on deck	38° 22,97' N	020° 00,33' W
71-2	1	21.03.2006	08:54	CTD/Rosette to water	38° 22,98' N	020° 00,22' W
			09:14	Heaving up	38° 23,01' N	020° 00,12' W
			09:37	CTD/Rosette on deck	38° 22,99' N	019° 59,93' W
71-3	1	21.03.2006	09:43	MSN to water	38° 23,01' N	019° 59,87' W
			10:01	Heaving up	38° 23,03' N	019° 59,72' W
			10:20	MSN on Deck	38° 23,07' N	019° 59,60' W
71-4	1	21.03.2006	10:25	MSN to water	38° 23,10' N	019° 59,58' W
			10:29	Heaving up	38° 23,12' N	019° 59,54' W
			10:35	MSN on Deck	38° 23,15' N	019° 59,50' W
71-5	1	21.03.2006	10:39	MSN to water	38° 23,16' N	019° 59,48' W
			10:44	Heaving up	38° 23,18' N	019° 59,44' W
			10:49	MSN on Deck	38° 23,20' N	019° 59,42' W
			10:52	Station completed	38° 23,20' N	019° 59,39' W
72	1	24.03.2006	07:30	Ship @ Station	36° 00,20' N	008° 29,90' W
			07:34	CTD/Rosette to water	36° 00,21' N	008° 29,92' W

			07:40	Heaving up	36°	00,26'	N	008°	29,92'	W
			07:46	CTD/Rosette on deck	36°	00,29'	N	008°	29,94'	W
72-2	1	24.03.2006	08:11	CTD/Rosette to water	36°	00,51'	N	008°	29,98'	W
			08:45	Heaving up	36°	00,70'	N	008°	30,02'	W
			09:20	CTD/Rosette on deck	36°	00,86'	N	008°	30,10'	W
72-3	1	24.03.2006	09:28	MSN to water	36°	00,91'	N	008°	30,11'	W
			10:23	Heaving up	36°	01,15'	N	008°	30,28'	W
			11:20	MSN on Deck	36°	01,43'	N	008°	30,45'	W
72-4	1	24.03.2006	11:25	MSN to water	36°	01,48'	N	008°	30,43'	W
			11:35	Heaving up	36°	01,54'	N	008°	30,45'	W
			11:47	MSN on Deck	36°	01,61'	N	008°	30,46'	W
72-5	1	24.03.2006	11:52	MSN to water	36°	01,61'	N	008°	30,46'	W
			12:00	Heaving up	36°	01,66'	N	008°	30,54'	W
			12:13	MSN on Deck	36°	01,75'	N	008°	30,58'	W
72-6	1	24.03.2006	12:15	MSN to water	36°	01,75'	N	008°	30,58'	W
			12:34	Heaving up	36°	01,87'	N	008°	30,73'	W
			13:00	MSN on Deck	36°	02,09'	N	008°	30,81'	W
72-7	1	24.03.2006	13:03	MSN to water	36°	02,09'	N	008°	30,81'	W
			13:47	Heaving up	36°	02,37'	N	008°	30,90'	W
			14:55	MSN on Deck	36°	02,76'	N	008°	31,04'	W
			16:00	Station completed	36°	02,77'	N	008°	31,04'	W
73	1	26.03.2006	06:14	Ship @ Station	36°	15,69'	N	002°	57,09'	W
			06:15	CTD/Rosette to water	36°	15,70'	N	002°	57,10'	W
			06:19	Heaving up	36°	15,71'	N	002°	57,06'	W
			06:28	CTD/Rosette on deck	36°	15,71'	N	002°	56,99'	W
73-2	1	26.03.2006	06:43	CTD/Rosette to water	36°	15,72'	N	002°	56,94'	W
			07:03	Heaving up	36°	15,71'	N	002°	56,87'	W
			07:21	CTD/Rosette on deck	36°	15,66'	N	002°	56,85'	W
73-3	1	26.03.2006	07:31	MSN to water	36°	15,63'	N	002°	56,84'	W
			07:50	Heaving up	36°	15,61'	N	002°	56,84'	W
			08:12	MSN on Deck	36°	15,57'	N	002°	56,81'	W
73-4	1	26.03.2006	08:17	MSN to water	36°	15,56'	N	002°	56,81'	W
			08:22	Heaving up	36°	15,56'	N	002°	56,81'	W
			08:26	MSN on Deck	36°	15,55'	N	002°	56,81'	W

73-5	1	26.03.2006	08:31	MSN to water	36°	15,53'	N	002°	56,81'	W
			08:41	Heaving up	36°	15,51'	N	002°	56,82'	W
			08:51	MSN on Deck	36°	15,48'	N	002°	56,83'	W
73-6	1	26.03.2006	08:58	MUC to water	36°	15,47'	N	002°	56,81'	W
			09:26	Boco / Heave up	36°	15,47'	N	002°	56,80'	W
			10:28	MUC on deck	36°	15,48'	N	002°	56,71'	W
			10:47	Station completed	36°	15,49'	N	002°	56,80'	W
74	1	26.03.2006	17:52	Ship @ Station	36°	15,04'	N	001°	59,58'	W
			17:53	MSN to water	36°	15,03'	N	001°	59,57'	W
			18:12	Heaving up	36°	15,03'	N	001°	59,40'	W
			18:35	MSN on Deck	36°	14,97'	N	001°	59,34'	W
74-2	1	26.03.2006	18:39	MSN to water	36°	14,96'	N	001°	59,37'	W
			18:44	Heaving up	36°	14,93'	N	001°	59,34'	W
			18:48	MSN on Deck	36°	14,91'	N	001°	59,31'	W
74-3	1	26.03.2006	18:52	MSN to water	36°	14,86'	N	001°	59,28'	W
			19:02	Heaving up	36°	14,78'	N	001°	59,21'	W
			19:13	MSN on Deck	36°	14,64'	N	001°	59,13'	W
74-4	1	26.03.2006	19:44	CTD/Rosette to water	36°	14,94'	N	001°	59,83'	W
			19:48	Heaving up	36°	14,94'	N	001°	59,80'	W
			19:56	CTD/Rosette on deck	36°	14,92'	N	001°	59,59'	W
74-5	1	26.03.2006	20:12	CTD/Rosette to water	36°	14,94'	N	001°	59,17'	W
			20:36	Heaving up	36°	14,94'	N	001°	58,74'	W
			20:56	CTD/Rosette on deck	36°	14,94'	N	001°	58,32'	W
74-6	1	26.03.2006	21:24	MUC to water	36°	15,01'	N	002°	00,55'	W
			22:15	Boco / Heave up	36°	15,05'	N	001°	59,86'	W
			23:30	MUC on deck	36°	15,02'	N	001°	59,98'	W
			23:35	Station completed	36°	15,02'	N	001°	59,98'	W
75	1	27.03.2006	08:45	Ship @ Station	37°	14,92'	N	000°	29,86'	W
			08:47	CTD/Rosette to water	37°	14,92'	N	000°	29,86'	W
			08:51	Heaving up	37°	14,97'	N	000°	29,79'	W
			08:58	CTD/Rosette on deck	37°	15,00'	N	000°	29,76'	W
75-2	1	27.03.2006	09:17	CTD/Rosette to water	37°	14,97'	N	000°	29,87'	W
			09:50	Heaving up	37°	15,02'	N	000°	29,83'	W
			10:26	CTD/Rosette on deck	37°	15,02'	N	000°	29,89'	W

75-3	1	27.03.2006	10:46	CTD/Rosette to water	37°	14,97'	N	000°	30,00'	W
			10:50	Heaving up	37°	14,97'	N	000°	30,00'	W
			10:54	CTD/Rosette on deck	37°	14,98'	N	000°	30,00'	W
75-4	1	27.03.2006	11:00	MSN to water	37°	14,98'	N	000°	30,01'	W
			11:19	Heaving up	37°	14,99'	N	000°	30,00'	W
			11:40	MSN on Deck	37°	15,00'	N	000°	30,00'	W
75-5	1	27.03.2006	11:45	MSN to water	37°	15,00'	N	000°	30,00'	W
			12:41	Heaving up	37°	14,99'	N	000°	30,01'	W
			13:50	MSN on Deck	37°	15,03'	N	000°	29,95'	W
75-6	1	27.03.2006	13:54	MSN to water	37°	15,00'	N	000°	30,00'	W
			14:04	Heaving up	37°	15,02'	N	000°	29,97'	W
			14:14	MSN on Deck	37°	15,03'	N	000°	29,93'	W
75-7	1	27.03.2006	14:21	MUC to water	37°	15,02'	N	000°	29,96'	W
			15:28	Boco / Heave up	37°	14,97'	N	000°	30,11'	W
			16:30	MUC on deck	37°	14,84'	N	000°	30,09'	W
			16:30	Station completed	37°	14,84'	N	000°	30,09'	W
76	1	28.03.2006	06:13	Ship @ Station	37°	45,06'	N	001°	29,93'	E
			06:19	CTD/Rosette to water	37°	45,10'	N	001°	29,92'	E
			06:24	Heaving up	37°	45,15'	N	001°	29,89'	E
			06:30	CTD/Rosette on deck	37°	45,21'	N	001°	29,86'	E
76-2	1	28.03.2006	06:51	CTD/Rosette to water	37°	44,99'	N	001°	29,98'	E
			07:09	Heaving up	37°	45,16'	N	001°	29,98'	E
			07:27	CTD/Rosette on deck	37°	45,30'	N	001°	29,96'	E
76-3	1	28.03.2006	07:40	MSN to water	37°	44,94'	N	001°	30,05'	E
			07:58	Heaving up	37°	45,03'	N	001°	30,00'	E
			08:21	MSN on Deck	37°	45,11'	N	001°	29,97'	E
76-4	1	28.03.2006	08:25	MSN to water	37°	45,12'	N	001°	29,97'	E
			08:28	Heaving up	37°	45,14'	N	001°	29,96'	E
			08:35	MSN on Deck	37°	45,16'	N	001°	29,94'	E
76-5	1	28.03.2006	08:53	MUC to water	37°	44,73'	N	001°	30,03'	E
			09:55	Boco / Heave up	37°	45,06'	N	001°	29,90'	E
			10:52	MUC on deck	37°	45,14'	N	001°	59,58'	E
			10:52	Station completed	37°	45,14'	N	001°	29,58'	E
77	1	28.03.2006	16:05	Ship @ Station	38°	25,06'	N	001°	51,87'	E

			16:09	CTD/Rosette to water	38°	25,08'	N	001°	51,82'	E
			16:14	Heaving up	38°	25,12'	N	001°	51,77'	E
			16:19	CTD/Rosette on deck	38°	25,15'	N	001°	51,75'	E
77-2	1	28.03.2006	16:33	CTD/Rosette to water	38°	25,20'	N	001°	51,75'	E
			16:52	Heaving up	38°	25,28'	N	001°	51,68'	E
			17:07	CTD/Rosette on deck	38°	25,31'	N	001°	51,64'	E
77-3	1	28.03.2006	17:12	MSN to water	38°	25,33'	N	001°	51,63'	E
			17:31	Heaving up	38°	25,38'	N	001°	51,56'	E
			17:57	MSN on Deck	38°	25,36'	N	001°	51,53'	E
77-4	1	28.03.2006	18:01	MSN to water	38°	25,36'	N	001°	51,52'	E
			18:05	Heaving up	38°	25,36'	N	001°	51,52'	E
			18:10	MSN on Deck	38°	25,39'	N	001°	51,52'	E
77-5	1	28.03.2006	18:37	MUC to water	38°	25,04'	N	001°	52,02'	E
			19:10	Boco / Heave up	38°	25,04'	N	001°	51,98'	E
			20:48	MUC on deck	38°	25,02'	N	001°	52,00'	E
			20:48	Station completed	38°	25,02'	N	001°	52,00'	E
78	1	29.03.2006	06:00	Ship @ Station	37°	59,98'	N	002°	29,89'	E
			06:12	CTD/Rosette to water	38°	00,00'	N	002°	29,83'	E
			06:17	Heaving up	38°	00,00'	N	002°	29,83'	E
			06:24	CTD/Rosette on deck	38°	00,00'	N	002°	29,84'	E
78-2	1	29.03.2006	06:43	CTD/Rosette to water	38°	00,03'	N	002°	29,86'	E
			07:16	Heaving up	38°	00,01'	N	002°	29,85'	E
			07:56	CTD/Rosette on deck	38°	00,04'	N	002°	29,80'	E
78-3	1	29.03.2006	08:01	MSN to water	38°	00,03'	N	002°	29,80'	E
			08:19	Heaving up	38°	00,03'	N	002°	29,77'	E
			08:43	MSN on Deck	38°	00,03'	N	002°	29,72'	E
78-4	1	29.03.2006	08:58	MSN to water	37°	59,96'	N	002°	30,00'	E
			09:51	Heaving up	37°	59,95'	N	002°	29,95'	E
			10:57	MSN on Deck	37°	59,94'	N	002°	30,10'	E
78-5	1	29.03.2006	11:07	MSN to water	37°	59,95'	N	002°	30,14'	E
			11:12	Heaving up	37°	59,95'	N	002°	30,14'	E
			11:17	MSN on Deck	37°	59,95'	N	002°	30,09'	E
78-6	1	29.03.2006	11:20	MSN to water	37°	59,95'	N	002°	30,09'	E
			11:30	Heaving up	37°	59,96'	N	002°	29,99'	E

			11:40	MSN on Deck	37° 59,96' N	002° 29,97' E
78-7	1	29.03.2006	11:50	MUC to water	37° 59,93' N	002° 29,96' E
			12:49	Boco / Heave up	37° 59,99' N	002° 30,02' E
			13:46	MUC on deck	38° 00,14' N	002° 30,49' E
			13:50	Station completed	38° 00,14' N	002° 30,49' E
79	1	30.03.2006	06:02	Ship @ Station	38° 25,28' N	005° 24,12' E
			06:06	CTD/Rosette to water	38° 25,30' N	005° 24,20' E
			06:12	Heaving up	38° 25,34' N	005° 24,31' E
			06:19	CTD/Rosette on deck	38° 25,40' N	005° 24,44' E
79-2	1	30.03.2006	06:46	CTD/Rosette to water	38° 25,00' N	005° 24,14' E
			07:19	Heaving up	38° 25,01' N	005° 24,19' E
			07:51	CTD/Rosette on deck	38° 25,04' N	005° 24,16' E
79-3	1	30.03.2006	07:56	MSN to water	38° 25,03' N	005° 24,14' E
			08:16	Heaving up	38° 25,04' N	005° 24,16' E
			08:41	MSN on Deck	38° 25,02' N	005° 24,15' E
79-4	1	30.03.2006	08:45	MSN to water	38° 25,02' N	005° 24,16' E
			08:48	Heaving up	38° 25,02' N	005° 24,16' E
			08:54	MSN on Deck	38° 25,02' N	005° 24,17' E
79-5	1	30.03.2006	08:56	MSN to water	38° 25,02' N	005° 24,17' E
			09:49	Heaving up	38° 25,03' N	005° 24,10' E
			10:55	MSN on Deck	38° 25,02' N	005° 24,04' E
79-6	1	30.03.2006	10:57	MSN to water	38° 25,02' N	005° 24,04' E
			11:05	Heaving up	38° 25,05' N	005° 24,08' E
			11:19	MSN on Deck	38° 25,07' N	005° 24,11' E
79-7	1	30.03.2006	11:24	MUC to water	38° 25,07' N	005° 24,11' E
			12:30	Boco / Heave up	38° 25,00' N	005° 24,01' E
			13:14	MUC on deck	38° 25,02' N	005° 23,94' E
			13:16	Station completed	38° 25,02' N	005° 23,94' E
80	1	31.03.2006	06:05	Ship @ Station	38° 09,91' N	008° 00,09' E
			06:08	CTD/Rosette to water	38° 09,90' N	008° 00,11' E
			06:13	Heaving up	38° 09,87' N	008° 00,16' E
			06:20	CTD/Rosette on deck	38° 09,84' N	008° 00,21' E
80-2	1	31.03.2006	06:36	CTD/Rosette to water	38° 10,03' N	007° 59,98' E
			07:08	Heaving up	38° 10,04' N	008° 00,02' E

			07:40	CTD/Rosette on deck	38°	10,02'	N	008°	00,00'	E
80-3	1	31.03.2006	07:45	MSN to water	38°	10,01'	N	007°	59,99'	E
			08:03	Heaving up	38°	10,01'	N	008°	00,00'	E
			08:26	MSN on Deck	38°	10,01'	N	007°	59,99'	E
80-4	1	31.03.2006	08:29	MSN to water	38°	10,01'	N	007°	59,99'	E
			08:33	Heaving up	38°	10,01'	N	007°	59,99'	E
			08:38	MSN on Deck	38°	10,01'	N	008°	00,00'	E
80-5	1	31.03.2006	08:42	MSN to water	38°	10,01'	N	007°	59,99'	E
			09:34	Heaving up	38°	10,02'	N	008°	00,00'	E
			10:40	MSN on Deck	38°	10,04'	N	007°	59,99'	E
80-6	1	31.03.2006	10:45	MSN to water	38°	10,01'	N	008°	00,09'	E
			10:55	Heaving up	38°	10,03'	N	008°	00,12'	E
			11:05	MSN on Deck	38°	10,05'	N	008°	00,18'	E
80-7	1	31.03.2006	11:15	MUC to water	38°	09,94'	N	008°	00,00'	E
			12:10	Boco / Heave up	38°	10,03'	N	008°	00,01'	E
			13:03	MUC on deck	38°	10,38'	N	007°	59,64'	E
			13:05	Station completed	38°	10,38'	N	007°	59,64'	E
81	1	01.04.2006	06:28	Ship @ Station	38°	45,16'	N	011°	00,65'	E
			06:29	CTD/Rosette to water	38°	45,16'	N	011°	00,65'	E
			06:36	Heaving up	38°	45,16'	N	011°	00,64'	E
			06:44	CTD/Rosette on deck	38°	45,13'	N	011°	00,64'	E
81-2	1	01.04.2006	07:02	CTD/Rosette to water	38°	45,12'	N	011°	00,65'	E
			07:18	Heaving up	38°	45,12'	N	011°	00,60'	E
			07:34	CTD/Rosette on deck	38°	45,10'	N	011°	00,61'	E
81-3	1	01.04.2006	07:52	MSN to water	38°	45,12'	N	011°	00,59'	E
			08:13	Heaving up	38°	45,13'	N	011°	00,57'	E
			08:37	MSN on Deck	38°	45,10'	N	011°	00,56'	E
81-4	1	01.04.2006	08:42	MSN to water	38°	45,09'	N	011°	00,55'	E
			08:45	Heaving up	38°	45,08'	N	011°	00,54'	E
			08:50	MSN on Deck	38°	45,08'	N	011°	00,52'	E
81-5	1	01.04.2006	08:55	MSN to water	38°	45,07'	N	011°	00,52'	E
			09:04	Heaving up	38°	45,07'	N	011°	00,50'	E
			09:15	MSN on Deck	38°	45,08'	N	011°	00,47'	E
81-6	1	01.04.2006	09:38	MUC to water	38°	45,12'	N	011°	00,59'	E

			10:10	Boco / Heave up	38° 45,16' N	011° 00,59' E
			12:00	MUC on deck	38° 45,32' N	011° 00,59' E
			12:02	Station completed	38° 45,32' N	011° 00,59' E
82	1	02.04.2006	07:02	Ship @ Station	38° 40,00' N	012° 29,96' E
			07:03	MSN to water	38° 39,99' N	012° 29,96' E
			07:24	Heaving up	38° 40,05' N	012° 29,83' E
			07:47	MSN on Deck	38° 40,09' N	012° 29,75' E
82-2	1	02.04.2006	07:51	MSN to water	38° 40,10' N	012° 29,73' E
			07:54	Heaving up	38° 40,11' N	012° 29,71' E
			08:00	MSN on Deck	38° 40,13' N	012° 29,67' E
82-3	1	02.04.2006	08:04	CTD/Rosette to water	38° 40,12' N	012° 29,65' E
			08:10	Heaving up	38° 40,13' N	012° 29,61' E
			08:18	CTD/Rosette on deck	38° 40,17' N	012° 29,55' E
82-4	1	02.04.2006	08:36	CTD/Rosette to water	38° 40,23' N	012° 29,44' E
			08:51	Heaving up	38° 40,21' N	012° 29,34' E
			09:12	CTD/Rosette on deck	38° 40,24' N	012° 29,28' E
			09:15	Station completed	38° 40,24' N	012° 29,27' E
			09:15	Ende der Stations- und Forschungsarbeiten		